

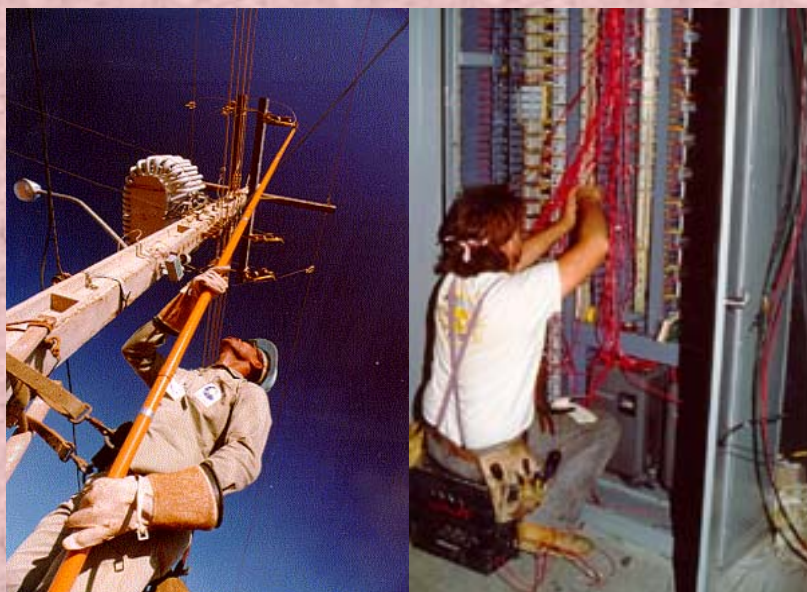
Course Curricula

for

**Short Term Courses based on
Modular Employable Skills (MES)**

in

ELECTRICAL Sector



**DIRECTORATE GENERAL OF EMPLOYMENT AND TRAINING
MINISTRY OF LABOUR & EMPLOYMENT
GOVERNMENT OF INDIA**

**Course Curricula for Short Term Courses based on Modular
Employable Skills (MES) in the Electrical Sector**

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Skill Development based on Modular Employable Skills (MES)

Background

The need for giving emphasis on the Skill Development, especially for the less educated, poor and out of school youth has been highlighted in various forums. The skill level and educational attainment of the work force determines the productivity, income levels as well as the adaptability of the working class in changing environment. Large percentage of population in India is living below poverty line. One of the important causes is lower percentage of skilled persons in the workforce

The skill development at present is taking place mostly in the informal way, i.e. persons acquire skill at the work-place when they help their parents, relatives and employers etc. Such persons do not have a formal certificate and thus earn lower wages and are exploited by employers. They have come through informal system due to socio-economic circumstances of the family and the compulsions of earning a livelihood rather than attending a formal course. While their productivity is low, their contribution to the national GDP cannot be ignored. If the country can create a system of certification which not only recognizes their skills but also provides education and training in a mode that suits their economic compulsions, it will not only benefit the workforce to earn a decent living but also contribute to the national economy by better productivity of this workforce.

Another related problem to be tackled is large number of students drop outs (About 63% of the school students drop out at different stages before reaching Class-X).

Frame work for Skill Development based on 'Modular Employable Skills (MES)'

Very few opportunities for skill development are available for the above referred groups (out of school youth & existing workers especially in the informal sector). Most of the existing Skill Development programmes are long term in nature. Poor and less educated persons can not afford long term training programmes due to higher entry qualifications, opportunity cost etc. Therefore, a new frame work for Skill Development for the Informal Sector has been evolved by the DGET to address to the above mentioned problems. The **key features of the new frame work for skill development** are:

- ◆ Demand driven Short term training courses based on modular employable skills decided in consultation with Industry
- ◆ Flexible delivery mechanism (part time, weekends, full time)
- ◆ Different levels of programmes (Foundation level as well as skill upgradation) to meet demands of various target groups
- ◆ Central Government will facilitate and promote training while Vocational Training (VT) Providers under the Govt. and Private Sector will provide training
- ◆ Optimum utilisation of existing infrastructure to make training cost effective.
- ◆ Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- ◆ Testing & certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on 'Modular Employable Skills (MES)'.

The **concept for the MES** is :

- Identification of 'minimum skills set' which is sufficient to get an employment in the labour market.
- It allows skills upgradation, multiskilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- It also allows recognition of prior learning (certification of skills acquired informally) effectively.
- The modules in a sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- Courses could be available from level 1 to level 3 in different vocations depending upon the need of the employer organisations.
- MES would benefit different target groups like :
 - Workers seeking certification of their skills acquired informally
 - workers seeking skill upgradation
 - early school drop-outs and unemployed
 - previously child labour and their family

Age of participants

The minimum age limit for persons to take part in the scheme is 14 years but there is no upper age limit.

Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a sector based on division of work in the labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose
- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT

(Close involvement of Employers Organizations, State Governments, experts, vocational training providers and other stake holders is ensured at each stages).

Development of Core Competencies

Possession of proper attitudes is one of the most important attribute of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programme.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding

them and setting up examples of good attitudes by demonstrated behaviors and by the environment provided during training.

Some important core competencies to be developed are:

1. Safety consciousness and safe working practices
2. Care of equipment and tools
3. Punctuality, discipline and honesty
4. Concern for quality
5. Respect for rules and regulations
6. Concern for health and hygiene
7. Cordial relationship and Cooperation with co-workers and team Work
8. Positive attitude and behavior
9. Responsibility and accountability
10. Learn continuously
11. Communication Skills
12. Concern for environment and waste disposal

Following competencies should also be developed during level-II and higher courses:

1. Ability for planning, organizing and coordinating
2. Creative thinking, problem solving and decision making
3. Leadership
4. Ability to bear stress
5. Negotiation

Duration of the Programmes

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

Pathways to acquire Qualification:

Access to the qualification could be through:

- An approved training programme; **Or**
- A combination of an approved training programme plus recognition of prior learning including credit transfer; **Or**
- The recognition of prior learning that provides evidence of the achievement of the competencies for the qualification.

Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for ‘hands on training’.

The training methods will be individual centered to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

Instructional Media Packages

In order to maintain quality of training uniformly all over the country, instructional media packages (IMPs) will be developed by the National Instructional Media Institute (NIMI), Chennai.

Assessment

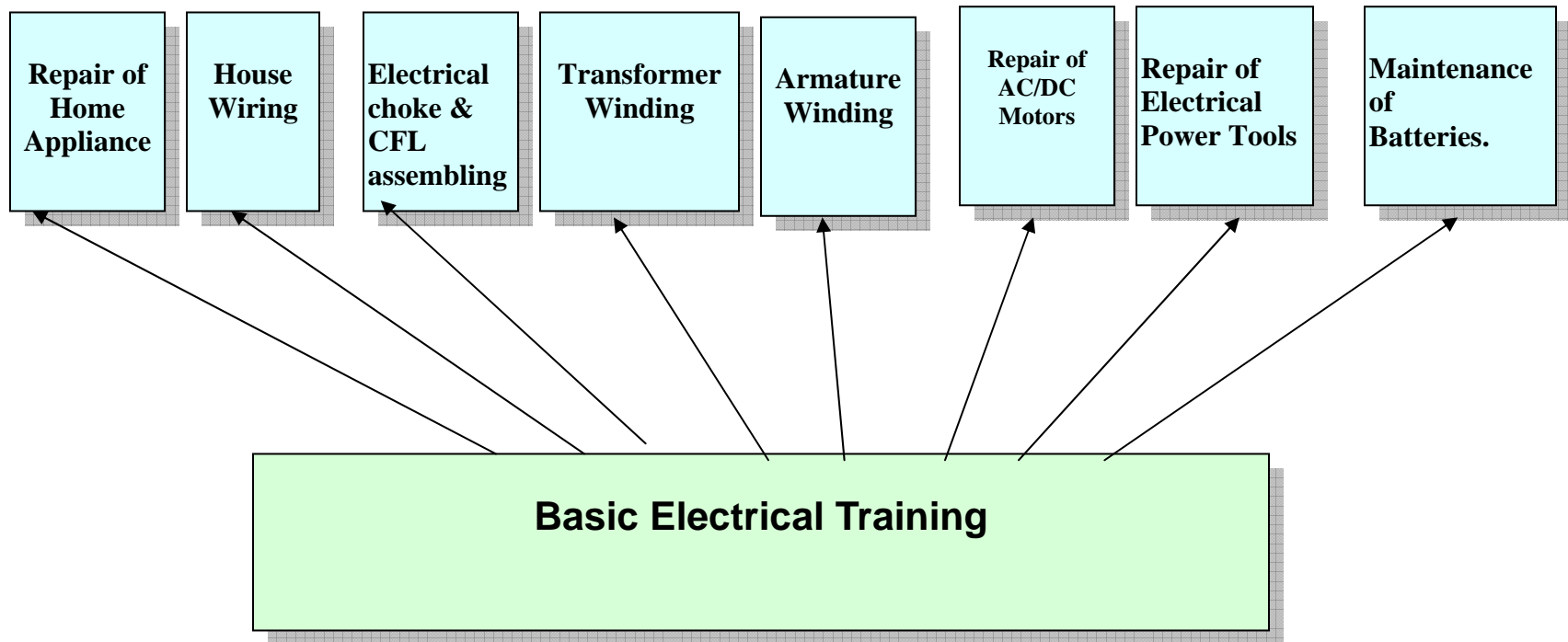
DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programmes. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a sector or an area.

Certificate

Successful persons will be awarded certificates issued by National Council for Vocational Training (NCVT).

Course Matrix in Electrical Trades

Proposed Course Outline/ Pathway



MODULES

Basic Electrical Training

Name : Basic Electrical Training
Sector : Electrical
Code
Entry Qualification : 5th Standard 14 years and Above
Duration : 120 Hrs

Terminal competency: The participant will be able to

- State what is an accident, the probable causes and safe attitude
- Rescue a person who is in contact with a live wire
- Understand the general safety of Tools and Equipments
- Describe electricity, conductor, insulator, voltage, current, resistance, P.D., and inter relation between Voltage, Current, and Resistance etc.
- Connect volt meter, watt meter, ammeter, energy meter, multimeter, materials in simple electric circuits and measure the units.
- Do various connections like series, parallel etc.
- Explain the difference between AC & DC
- Describe the purpose of Earthing and Types of Earthing.

Course contents:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|--|
| <ul style="list-style-type: none"> • Safety practice – <ul style="list-style-type: none"> ○ Lifting and handling loads. ○ Heavy Equipments | <ul style="list-style-type: none"> • Safety practices – lifting and handling. |
| <ul style="list-style-type: none"> • Safety practice – <ul style="list-style-type: none"> ○ Fire extinguishers ○ Types of fire extinguishers | <ul style="list-style-type: none"> • Safety practices – Fire fighting |
| <ul style="list-style-type: none"> • General safety of tools and equipments | <ul style="list-style-type: none"> • Nature of working of tools and equipments. |
| <ul style="list-style-type: none"> • Electrical safety <ul style="list-style-type: none"> ○ Rescue a person who is in contact with live wire. ○ Treat a person for electric shock/injury. | <ul style="list-style-type: none"> • Electrical safety practice <ul style="list-style-type: none"> ○ Rescue a person who is in contact with live wire. ○ Treat a person for electric shock/injury. |
| <ul style="list-style-type: none"> • Introduction to Electricity • Conductors and types of conductors • Insulators and types of insulators • Crimping & crimping tool • Soldering | <ul style="list-style-type: none"> • Prepare Terminations <ul style="list-style-type: none"> ○ Skinning Different types of cable ends ○ Make various joints in cable ○ Crimping cable ends. ○ Soldering the cable lugs |
| <ul style="list-style-type: none"> • Define simple electrical terms like voltage, current, resistance and their units. | <ul style="list-style-type: none"> • Simple electrical connections using resistance, voltmeter, and ammeter, multimeter |
| <ul style="list-style-type: none"> • Simple series and parallel circuits | <ul style="list-style-type: none"> • Connecting number of lamps in series connection. • Connecting number of lamps in parallel connection. |
| <ul style="list-style-type: none"> • Direct current and testing the polarity • Alternating current and identifying phase, neutral and earth terminals | <ul style="list-style-type: none"> • Testing the polarity of DC supply. • Identification of phase and neutral in single phase supply |
| <ul style="list-style-type: none"> • Purpose of Earthing • Types of Earthing. <ul style="list-style-type: none"> ○ Pipe Earthing ○ Plate Earthing | <ul style="list-style-type: none"> • Carry out of pipe earthing • Carry out of plate earthing |
| <ul style="list-style-type: none"> • Simple house wiring circuit. | <ul style="list-style-type: none"> • Repairing of house wiring faults. |

Tools and Equipments:

1. Connector, 6"
2. Screw Driver 8" 10", 12"
3. Cutting Pliers 6", 8"
4. Neon Tester
5. Heavy Duty Screw Driver 10", 12"
6. Nose Pliers 6"
7. Crimping tool
8. Volt meter 0-600 V (MC Type)
9. Volt meter 0-600 V (MI Type)
10. Ammeter 0-5 (MC Type)
11. Ammeter 0-5 (MI Type)
12. Watt meter 0-2.5KW
13. Energy meter 0-10A,240V
14. Multimeter
15. Megger 500V
16. Line Tester
17. Types of fire extinguishers
18. Common tools used in electrical field.
19. Soldering iron 25W, 250V

Repair of Home Appliance

Name : Repair of Home Appliance
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
MES Modules on Basic Electrical Training

Duration : 120 Hrs

Terminal competency : The participant will be able to

1. Observe the safety precautions while working
2. Test line cord for continuity with test lamp/multimeter
3. Prepare a heating element for a heater as required specification.
4. Replace the old element for heater, kettle, non –automatic electronic iron, room heaters etc., with a new one
5. Dismantle and reassemble an electric iron, heater, kettle, room heater, toaster, hair dryer, mixie etc.
6. Install a ceiling fan and the regulator.
7. Check a fluorescent lamp chock, starter and install it.

Course contents:

| Underpinning Knowledge (Theory) | Practical Competencies |
|--|---|
| Safety precaution | <ul style="list-style-type: none"> • Safety precaution |
| Install, service and repair all kinds of electrical home appliances | <ul style="list-style-type: none"> • General repair of heating iron, kettle, ceiling fan, table fan, washing machine etc., • Test the fan capacitors. • Clean and lubricate the bearing of ceiling and table fan, and check the speed. • Regulator of both fan. |
| Repair and rectification of an automatic electric iron, servicing and repairing of mixer, ceiling and table fan. | <ul style="list-style-type: none"> • Measure the insulation resistance between the terminals and body of the appliance • Check the oscillator mechanisms of table fan |
| Assemble and install a fluorescent6 lamp. | <ul style="list-style-type: none"> • Select the fuse size according to the load of circuit |
| Thermostat heat controls of Automatic electric iron, steam iron, spray irons. Understand home appliances like heater, iron, kettle ceiling fan, table fan, washing machine etc. | <ul style="list-style-type: none"> • Dismantle and reassemble automatic iron, ceiling fn table fan cooking range, storage heater, washing machines, and wet grinders etc. |
| Maintenance of decorative serial lamp for a required supply voltage | <ul style="list-style-type: none"> • Determine the number of lamps to be connected in series for particular supply voltage for making decorative serial lamp. |
| Assemble, connect and install a twin fluorescent lamp with accessories | <ul style="list-style-type: none"> • Check the internal connections of cooking range selector switch and circuits. connections in different temperature arrangements |
| Repair and service technique of cooking range, storage water heater, washing machines, wet grinders. Replace the heating element in a soldering. | <ul style="list-style-type: none"> • Check the simple mechanical timer, small water pump of washing machines and regular service and faults. • Repair of house wiring. |

Tools and Equipments:

1. Electric Heater
2. Electric Iron
3. Electric Kettle
4. Ceiling Fan
5. Table Fan
6. Washing Machine
7. Automatic Iron
8. Cooking Range
9. Storage Heater
10. Wet Grinder
11. Connector, 6"
12. Screw Driver 8", 10", 12"
13. Cutting Pliers 6", 8"
14. Neon Tester
15. Heavy Duty Screw Driver 10", 12"
16. Nose Pliers 6"
17. Soldering iron
18. Multimeter

House wiring

Name : House wiring
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
MES Modules on Basic Electrical Training
Duration :120 hrs
Terminal competency: The participant will be able to

1. Observe the safety precautions while working
2. List of necessary hand tools and their uses
3. Cater and maintenance of wiring tools
4. Draw and describe simple electrical circuits.
5. Understand the different system of wiring used for domestic installation.
6. Understand the necessity of good earthing in an electrical installation.
7. Do the domestic installation testing before energizing a domestic installation.

Course Contents:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|---|
| Safety precaution | <ul style="list-style-type: none"> • Safety precaution |
| Safety equipments that should be available with an electrician working on line electrical installation. | <ul style="list-style-type: none"> • Common hand tools, their uses, care and maintenance. |
| ISI rules related to wiring (General) | <ul style="list-style-type: none"> • Identify the wiring accessories as per symbols. |
| Introduction to electricity Conductor & Insulator. Joints in Electrical Conductor | <ul style="list-style-type: none"> • Make simple twist joints • Make married joint in stranded conductors. • Make tee joint in stranded conductor. |
| Diagram and systems used in domestic wiring installation | <ul style="list-style-type: none"> • Prepare T.W Board for fixing Flush type accessories. • Make the wiring layout for a bed room of a house with 6 points. • Carryout the wiring in PVC casing and capping as per layout. |
| Earthing – Types. Earthing domestic installation I E rule for Energy meter Installation. | <ul style="list-style-type: none"> • Carryout pipe earthing pipe earthing as per I E rule. • Prepare are mount energy meter board • Carryout domestic installation testing |

Tools & Equipemnts:

1. Screw Driver 8", 10", 12"
2. Combination Pliers 6", 8"
3. Neon Tester
4. Round Nose Plier 15 cm
5. Electrician Knife 10 cm
6. Heavy Duty Screw Driver 10", 12"
7. Nose Pliers 6"
8. B.P.Hammer 1/2Kg, 1/4Kg
9. Cold Chisel 15 cm
10. Tri Square 30 cm
11. Fermer chisel 14cm, 20cm, 25cm
12. Pocker 15cm
13. Power drilling Machine 6 mm
14. Hacksaw 30 cm
15. Wire shipper 10 cm
16. Measuring tape 5 meters

Electronic Choke & CFL assembling

Name : **Electronic Choke & CFL assembling**
Sector : **Electrical**
Code
Entry Qualification : **8th Standard 14 years and Above**
MES Modules on Basic Electrical Training
Duration : **120 hrs**

Terminal Competency The participant will be able to

1. Observe the safety precautions while working
2. Tell the resistance value by seeing the colour coded resistor and verify with the multimeter
3. List the names of the Electronic components used in the circuit.
4. Insert the components as per layout of PCB
5. Solder the components.
6. Taking the input and output leads.
7. Test the assembled circuit.

Course Contents:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|---|
| Safety Precaution | Safety Precaution |
| Colour code of carbon resistors | Practicing the color coded resistor value then verifying with the multimeter. |
| Familiarization with different Electronic components used like capacitor, transistor, diode, choke coil etc., | Testing of different types of Electronic components. |
| Study the components symbol as per diagram | Practicing the symbol components as per diagram/circuit/ |
| Interpret the components as per circuit and laying the components on PCB | Lay the components as per layout then soldering on PCB |
| Testing of assembled PCB | Trouble shooting if any on assembled circuit |

Tools & Equipment:

- 1 Soldering iron 25W, 230V
- 2 Neon tester
- 3 Multimeter
- 4 Combination Plier.
- 5 Nose plier
- 6 Wire stripper
- 7 Electrician Knife.

Transformer Winding

Name : Transformer Winding
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
MES Modules on Basic Electrical Training
Duration 120 hrs

Terminal competency

The Participant will be able to

1. Dismantle the transformer cores
2. Measure and also determine the size of winding wire for primary and secondary
3. Take the dimensions of a bobbin and prepare the bobbin from suitable materials
4. Wind the primary and secondary winding layer by layer.
5. Stack the cores and fasten them
6. Test the transformer for insulation, transformation ratio and performance

| Underpinning Knowledge (Theory) | Practical Competencies |
|--|---|
| Safety precautions | <ul style="list-style-type: none"> • Safety precautions |
| Identification of phase and neutral in single-phase A/C. supply, | <ul style="list-style-type: none"> • Testing the supply using test lamp with different wattage lamps. |
| Test a single-phase transformer for its continuity and insulation. | <ul style="list-style-type: none"> • Take the dimensions of a bobbin and prepare the bobbin from suitable materials |
| Measuring a enameled winding wire with Std wire gauge. | <ul style="list-style-type: none"> • Measure and also determine the size of winding wire for primary and secondary |
| Wind/rewind a small transformer | <ul style="list-style-type: none"> • Dismantle /reassemble the transformer cores • Wind the primary and secondary winding layer by layer. |
| Use & Operation of hand operated and motorized coil winding machine. | <ul style="list-style-type: none"> • Familiarization and operation with the motorized coil winding machine – General maintenance to be done |
| Impregnation Varnish after testing the transformer – its advantages. | <ul style="list-style-type: none"> • Test the transformer for insulation, transformation ratio and performance |

Tools and equipments:

1. Screw Driver 8", 10", 12"
2. Cutting Plier 6", 8"
3. Neon Tester
4. Heavy Duty Screw Driver 10", 12"
5. Nose Plier 6"
6. Standard Wire Gauge
7. Motorized coil winding machine
8. Hand operated coil winding machine

Armature winding

Name : Armature winding
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
 MES Modules on Basic Electrical Training
Duration : 120 hrs

Terminal Competency: The participant will be able to

1. Observe the safety precautions while working
2. Check and test the armature.
3. Strip the old winding from the armature
4. Record the winding data
5. Prepare the armature for rewinding
6. Wind the coils by hand insulate them
7. Solder the leads to the commentator raisers.
8. Varnish the armature winding.
9. Understand end connection, electrical and distinguishing start and finish of each

| Underpinning Knowledge (Theory) | Practical Competencies |
|--|--|
| Safety precautions | <ul style="list-style-type: none"> • Safety precautions |
| Type of winding like lap and wave winding Introduction to armature winding Method of dismantling the burnt winding wire. | <ul style="list-style-type: none"> • Study the parts of armature. • Check and test the armature. Strip the old winding from the armature |
| Terminology used in winding like pole pitch coil pitch back and front pitch progressive and retrogressive winding etc. | <ul style="list-style-type: none"> • Record the winding data |
| A/C/DC armature winding. | <ul style="list-style-type: none"> • Prepare the armature for rewinding |
| Preparation of winding data for given armature. | <ul style="list-style-type: none"> • Wind the coils by hand insulate them • Connection of armature leads on raiser. |
| Preparation of winding table , connection diagram, winding diagram for given armature. | <ul style="list-style-type: none"> • Understand end connection, electrical and distinguishing start and finish of each |
| Impregnation methods of armature after rewinding and testing. | <ul style="list-style-type: none"> • Varnish the armature winding |

Tools and equipments:

1. Screw Driver 8", 10", 12"
2. Cutting Plier 6", 8"
3. Neon Tester
4. Heavy Duty Screw Driver 10", 12"
5. Nose Plier 6"
6. Standard Wire Gauge
7. Motorized coil winding machine
8. Hand operated coil winding machine
9. Grumbler
10. Multimeter

Rewinding of AC/DC Motor

Name : Rewinding of AC/DC Motor
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
MES Modules on Basic Electrical Training
Duration : 120 hrs
Terminal Competency

The participant will be able to

1. Observe the safety precautions while working
2. List the materials used for motor winding
3. Method of stripping the old winding and preparing the winding former and coils
4. Prepare the winding former and the coils
5. Wind the coils for starting and running winding
6. Method of inserting coil in the slots.

Course contents:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|--|
| Safety Precaution | <ul style="list-style-type: none"> • <i>Safety Precaution</i> |
| knowledge about Single phase and 3-phase supply. | <ul style="list-style-type: none"> • List the conducting and insulating materials used in motor winding |
| Introduction to re-winding Insulating material used | <ul style="list-style-type: none"> • Testing the motor before declaring for rewinding |
| Terminology used in single phase and three phase winding like pole pitch coil pitch etc., | <ul style="list-style-type: none"> • Prepare the winding former and the coils |
| Method of stripping the old winding and preparing the winding former and the coils. | Method of stripping the old winding and preparing the winding former and the coils |
| Preparation of winding data for given Motor. | Method of inserting coil in the slots. |
| Procedure followed for re-winding of all kind of electric motors like single phase A./C. motors, pump motors, ceiling fan motors, table fan motors, washing machine motors etc. | <ul style="list-style-type: none"> • Making end connections |
| Various methods used of inserting coil into the slots. Preparation of winding table , connection diagram, winding diagram for given Motor. | Testing the motor after rewinding |
| Test to be done after re-winding-impregnation methods of winding | <ul style="list-style-type: none"> • Impregnation methods of winding |

Tools & Equipment:

1. Screw Driver 8" 10", 12"
2. Cutting Plier 6", 8"
3. Neon Tester
4. Heavy Duty Screw Driver 10", 12"
5. Nose Plier 6"
6. Standard Wire Gauge
7. Motorized coil winding machine
8. Hand operated coil winding machine

Repair of Electrical Power Tools

Name : Repair of Electrical Power Tools
Sector: : Electrical
Code
Entry Qualification : 5th Standard 14 years and Above
MES Modules on Basic Electrical Training
Duration : 120 Hrs.

- Terminal Competency:** Participants will be able to do
1. Observe the safety precautions while working
 2. The maintenance and troubleshooting techniques of single – phase motors
 3. General maintenance procedures and tests that should be conducted on the main parts.
 4. Identify the motor leads that are tagged or color coded according to the standardized color code.
 5. Trouble shoots capacitor motors and how to work safely with capacitors in order to avoid electrical shock.
 6. Determine which of the specific parts to check when the motor fails to start.
 7. Identify the symptoms of trouble in universal motors.
 8. Repair of hand drilling machine, marble cutter, heavy duty mini grinder, sander/polishers, blower, heavy duty cutter and portable cutoff saw.
 9. Dismantling and reassembling of single phase motor.
 10. Use diagnostic table to help in troubleshooting motor in plant

Course content:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|--|
| Safety precautions | Safety precautions |
| Classification of single phase motors – parts, construction and working of single phase motors | <ul style="list-style-type: none"> • Dismantling and reassembling of single phase motors like permanent capacitor, capacitor start induction run, capacitor start capacitor run, Universal motors. |
| Classification of electrical power tools as per their application like hand drilling machine, angle grinder, rotary hammer, sander/polisher, blower, heavy duty cutter, portable cut off saw etc., | <ul style="list-style-type: none"> • Dismantling and reassembling of electrical power tools used like hand drilling machine, angle grinder, rotary hammer, marble cutter , heavy duty mini grinder, sander/polisher, blower , heavy duty cutter, portable cut off saw etc., |
| Trouble shooting technique in electrical power tools – like insulation testing armature defects, field winding, stator winding defects, noisy operation bearing problem, carbon brush changing, turning the commutator surface. | Trouble shooting in hand tools testing of insulation, armature defects, capacitor testing, carbon brush replacing after bedding – testing the protective devices. |
| Symptoms and causes of motor troubles – preventive and breakdown maintenance. | <ul style="list-style-type: none"> • Preventive maintenance of hand tools, overhauling, changing defective parts etc., |

Tools and equipments:

1. Screw Driver 8", 10", 12"
2. Cutting Pliers 6", 8"
3. Neon Tester
4. Heavy Duty Screw Driver 10", 12"
5. Nose Pliers 6", 8"
6. DE Spanner Set 8 Nos.
7. Pipe Wrench 22mm
8. 13mm two speed driller
9. 100mm Heavy duty mini Grinder
10. 150mm Straight Grinder
11. Dual speed flexible grinder
12. 180mm Sander/Polisher
13. Blower
14. Heavy duty Cutter
15. Portable cut-off saw

Maintenance of Batteries

Name : Maintenance of Batteries
Sector : Electrical
Code
Entry Qualification : 8th Standard 14 years and Above
MES Modules on Basic Electrical Training
Duration : 60 hrs

Terminal Competency:

The participants will be able to:

1. Observe the safety precautions while working
2. Preparation of electrolyte
3. Preparation of cells and arrangements of cells
4. Assembling of battery
5. Charging / recharging of battery
6. Care and preventive maintenance of battery

Course Content:

| Underpinning Knowledge (Theory) | Practical Competencies |
|---|--|
| Safety precautions | <ul style="list-style-type: none"> • Safety precautions |
| Construction a lead acid battery | <ul style="list-style-type: none"> • Preparation of electrolyte |
| How to keep lead acid battery health. | <ul style="list-style-type: none"> • Preparation of cells and arrangements of cells |
| Recharging of battery, | <ul style="list-style-type: none"> • Assembling of battery |
| Check the condition of battery, reading of hydrometer, preparation of electrolyte and chemical effect. Battery chargers and its application precautions to be taken while operation. | <ul style="list-style-type: none"> • Charging / recharging of battery • Care and preventive maintenance of battery |

Tools and equipments:

1. Screw Driver 8” 10”, 12”
2. Cutting Pliers 6”, 8”
3. Neon Tester
4. Heavy Duty Screw Driver 10”, 12”
5. Nose Pliers 6”
6. Hydrometer
7. High Discharge Tester
8. Battery charger

List of Expert/Trade Committee Members

CURRICULUM DEVELOPMENT FOR SHORT TERM COURSES BASED ON MODULAR EMPLOYABLE SKILLS

SECTOR/AREA: **Electrical**

| Sl. | Name & designation | Remarks |
|-----|--|----------|
| | S/shri | |
| 1 | V.M.Rao, Director, ATI (V), Hyderabad | Chairman |
| 2 | S.Mastan, Sr.Manager, Midhani, Hydesrabad | Member |
| 3 | S.N.Pille, Chief Executive, S.N.Engineers, Hyderabad | Member |
| 4 | I.Nagaraju, RC All.Tech.Power Systems Pvt.Ltd, Hyd | Member |
| 5 | H.Somasundram, Director, ATI EPI, R'pur, Hyderabad | Member |
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| 10 | V.V.Subba Rao, -do- | Member |
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| 13 | S.Venugopalan, TO, -do- | Member |